

Figure 13 shows an overview of a structure of a recipe 1300, according to an embodiment of the present invention.

5 Recipe 1300 is an entity that combines process resources such as routing 1310 (equipment, labor, energy etc.), optional process instructions 1320 (procedures), materials 1330 (formulae), optional safety information 1340 and optional quality specifications 1350. Each of these elements may be managed separately and may be linked together in accordance with embodiments of the present invention to form a complete product repository (database) called a recipe.

10 The formula 1330 may be a required component of recipe 1300. Formula 1330 may specify process inputs (ingredients), process outputs (product, co-products and by-products) and process instructions (text combined with process parameters such as speed, temperature etc.) It may be maintained separately from recipes making reference to it. In other words a formula may be used by an unlimited number of recipes and any changes to a formula affect the recipes that are using (e.g., make reference to) it.

15 In accordance with embodiments of the present invention, several basic views of the material list may be provided. A first view gives a condensed list sequenced by operation steps, it describes the flow of material through the process. A second view may be the appropriate set of materials for the selected operation step.

20 Routing 1310 of Figure 13 may encompass a sequenced set of operations that describe the process flow through a list of activities to be performed and the

resources required to execute these activities. Functionality may be provided to display recipe operation steps dependencies with a graphical editor.

Optional process instructions 1320 may be a set of information that describes

- 5 the procedure to be carried out at a particular operation step of the process.

Process parameters such as speed, volume, maximum temperature, etc. may be specified either for the whole operation step or for a specific operation step/ingredient combination.

- 10 Optional safety information 1340 may include regulatory information as an integrated component of recipe 1300. Access to regulatory information directly from the recipe may be available.

- 15 Optional quality specifications 1350 may define the manufacturing quality requirements, sample rates and test procedures associated with recipe 1300.

A unique validity rules record may be defined for a particular use (production, planning, etc.) against each product in a recipe when different recipes can be used based on the quantity to produce (min/max quantity range).

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A unique validity rules record may also be defined when recipe use may be restricted by date (from/to date). When a recipe is expected to expire at a particular date, the user may set up future recipes with a start date that corresponds to the expiration date of the current valid recipe.

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Further, a unique validity rules record may also be defined when multiple recipes for a particular use qualify given the quantity to produce and date. In this case a unique preference number must be defined.

- 5 Validity rules are primarily used to determine all levels of a recipe during the explosion process (costing, manufacturing resource planning, etc.) and to present a list of possible recipes to the user when creating a batch process.

10 With a recipe validity rules structure in place, the user can define different recipes for a particular product and determine under which condition each individual recipe can be used using Validity Rules. There can be more than one recipe defined for the same purpose. Further, the same recipe can be used for different purposes by associating multiple Validity Rules to it. There may be only one Validity Rules record per formula use.

15 Figure 1 illustrates display screen components of a graphical user interface for recipe navigation 100, according to an embodiment of the present invention.

20 A portion of the display screen presents the Recipe Navigator Tree 200. Recipes and recipe components may be presented to the user in a hierarchical manner. The tree control offers a novel navigation paradigm allowing the user to navigate through data objects (recipes in this case) not forms. Any of the items in the tree structure 200 may be selected by a user, e.g., using a keyboard or a mouse and cursor. Selected items may have a displayed screen attribute indicating
25 the selection. Additional functional display areas may be provided along with the navigator tree 200 as described below: